INSTRUCTIONS FOR OPERATING AND INSTALLING THE BOSCH RADIO RECEIVER ~ *Model Forty-Six*

AMERICAN BOSCH MAGNETO CORP.
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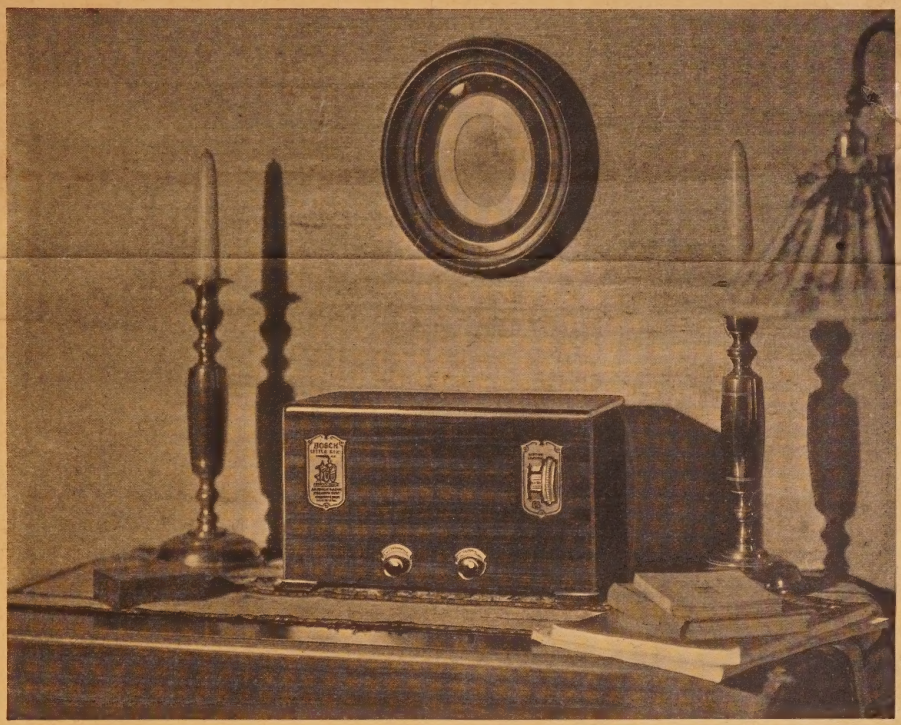

Foreword

WHETHER the installation of your Bosch Receiver is made by yourself or by your dealer, it is advisable that you read the instructions given throughout this manual. Certain very specific details relating to the operation and maintenance of the set are important and should be familiarized.

Before leaving the factory, every part of the receiver has been thoroughly inspected and tested to assure its giving complete satisfaction. Under no circumstances should any adjustments be made on the set by others than the authorized Bosch Radio dealer. Regardless of your previous radio experience it is advisable that you follow closely only the instructions given in this manual.

Should you require any additional information about your Bosch Radio, do not hesitate to call upon the Bosch Radio Dealer or upon the Service Division at Springfield.

AMERICAN BOSCH MAGNETO CORPORATION :: Springfield, Massachusetts

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INSTRUCTIONS FOR INSTALLING THE BOSCH "LITTLE SIX" RECEIVER ~ *Model 46*

The Bosch "Little Six" is a compact radio receiver having three stages of tuned radio-frequency, a detector, and two stages of transformer coupled audio amplification. Sensitivity and sharpness of tuning are obtained through the use of three radio stages, the first of which incorporates the new Bosch antenna tuning device. Quality reproduction is obtained by means of a carefully designed audio system, using special Bosch transformers. Ease of operation is assured by a single station selector. The set is so constructed that there are no adjustments of any kind to be made by the owner.

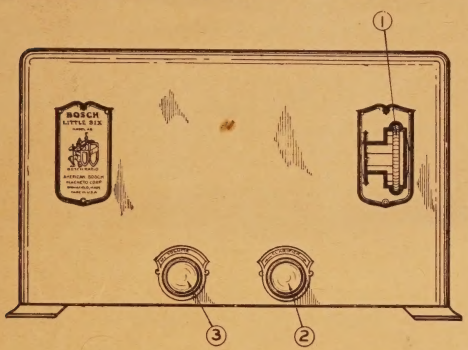

Fig. 1—The Bosch "Little Six" Receiver

Nomenclature:

1. Station Selector Drum.
2. Clarifier Control.
3. Volume Control.
4. "Long Antenna" Terminal.
5. "Short Antenna" Terminal.
6. "Ground" Terminal.
7. "Speaker" Terminals.
8. 1st R.F. Tube Socket.
9. 2nd R.F. Tube Socket.
10. 3rd R.F. Tube Socket.
11. Det. Tube Socket.
12. 1st Audio Tube Socket.
13. 2nd Audio Tube Socket.
14. Grid Leak.

Station Selector (1): The Station Selector consists of a single drum of large diameter, designed to facilitate exact tuning. The dial scale is softly illuminated, a bright line of light indicating the correct reading. The Bosch "Line-O'-Light" makes accurate logging possible, and once logged, the station will always be found at the identical setting. Changes in length of antenna will not affect the dial readings.

Clarifier (2): A special Bosch feature is the "Clarifier" which automatically compensates for the antenna and for the differing characteristics of reception between the two ends of the broadcast band. For ordinary tuning—"cruising the air"—no readjustment of the "Clarifier" is necessary. When exceptional selectivity and sensitivity are desired, a slight adjustment will bring the receiver to the highest state of efficiency.

Volume Control (3): Simplicity of control is expressed in the Bosch Combination Volume Control and Switch on the Bosch "Little Six." A slight movement to the right turns the receiver "on," lighting the tubes and illuminating the dial. Further movement to the right provides a smooth increase in volume —from the merest whisper of sound to the maximum of response.

"Long Antenna" Terminal (4): This terminal is provided for use with exceptionally long antennas, or for locations where great selectivity is required.

"Short Antenna" Terminal (5): This terminal is for antennas of average length. In most cases it will be necessary to use that antenna post which allows proper tuning of the "Clarifier" to be obtained.

"Speaker" Terminals (7): The speaker terminal posts are suitable for any type of cord terminals. Connect the lead with the colored tracer to the positive (+) post.

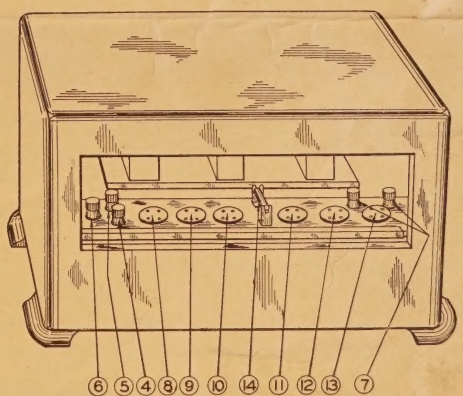

Fig. 2—Rear View of Receiver

Power Supply

The power supply to the Model 46 consists of three component systems, the "A" or filament supply, the "B" or plate supply, and the "C" or grid voltage. Either batteries or socket power devices (eliminators) are suitable for any or all of the three systems.

"A" Supply: The "A" or filament current is carried by the red and black wires of the supply cable or harness. The *red* or positive lead connects to the positive ("plus" "+") terminal of the power supply, and the *black* or negative lead to the negative ("minus" "—") terminal.

Figure 3 shows the connections when "A" current is supplied by a 6-volt storage battery of from 80 to 120 ampere-hours capacity. It is strongly recommended that this unit be provided with a trickle charger to keep the battery at its highest efficiency, and consequently eliminate the annoyance and expense of battery recharging.

Figure 4 shows the wiring when an "A" power unit is used. A good "A" socket-power unit (eliminator) is recommended to replace the "A" battery. This unit must be able to supply approximately 2 amperes at 6 volts. The Bosch "Nobattry" A eliminator is designed especially for use with Bosch receivers.

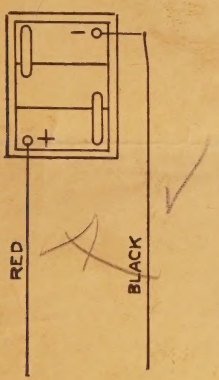

Fig. 3

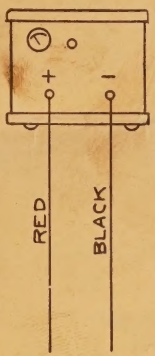

Fig. 4

The majority of "A" socket-power devices contain an automatic relay switch which, when the Model 46 is turned "off" through the Volume Control, will automatically switch off or diconnect the "A" eliminator from the receiver. If your unit does not contain such a relay, the "A" power unit must be turned off when not in use.

"B" Supply: The "B" or plate current is carried by the black lead with green tracer (—B), the blue lead (+45, detector), the brown lead (+90), and the green lead (+ 135 to + 180). For the "B" supply, either batteries or preferably a "B" socket-power unit (eliminator) may be used. The Bosch "Nobattry," "B" eliminator, is designed particularly for operation with the Bosch Receivers, and its use is especially recommended.

If batteries are used they should be only high grade 45-volt blocks of the heavy duty type.

Connections must be made as in figure 5.

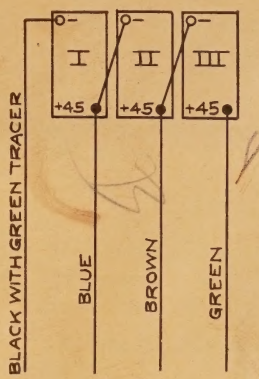

Fig. 5

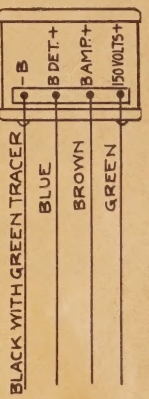

Fig. 6

Connections to the Bosch "Nobattry" must be made as in figure 6.

Note: The Nobattry must *always* be turned off when the receiver is not in use, either by its own switch, or by an automatic relay switch.

In case a "B" power unit, other than the Bosch "Nobattry" is used, make sure that the voltages, under load, are sufficient to operate the receiver. Connections should be made so that the voltages on the various leads will be as follows:

1. Black with green tracer	Negative (— B)
2. Blue	+ 45 (Detector)
3. Brown	+ 90 (RF and 1 AF)
4. Green	+ 135 to + 180 (2nd AF)

"C" Supply: Ordinary "C" batteries form the most satisfactory voltage source. Tone and clear reproduction are dependent on "C" supply and it is therefore important that this part of the installation be not neglected.

The "C" voltage is impressed by two small batteries in all ordinary installations. As no current is drawn from the cells, their life is extremely long.

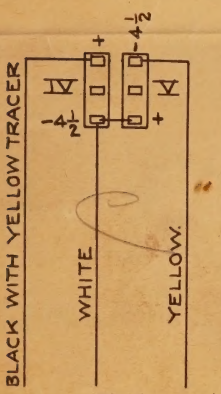

Fig. 7

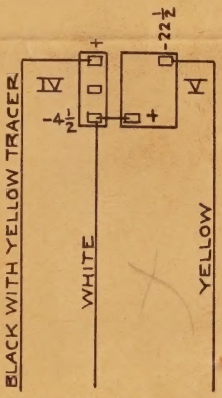

Fig. 8

The black wire with yellow tracer, the white, and the yellow wire connect the "C" batteries to the receiver. Correct connections are shown in figures 7, 8 and 9.

When the type 112 power tube (see "Tube Recommendations") is used the "C" batteries must be connected as shown in figure 7.

When the type 171 power tube (see "Tube Recommendations) is used with three 45-volt "B" batteries or any other 135-volt supply (as from an eliminator) connections are made as shown in figure 8.

When the type 171 tube is used with the Bosch "Nobattry," with four "B" batteries, or with any supply of from 150 to 180 volts, a "C" voltage of from —27 to —40 volts is necessary. Connections must be made as in figure 8. Additional voltage is obtained by connecting additional 4½-volt "C" batteries in series with the 22½-volt block. The proper value is best determined by trial, using that combination which gives the most pleasing audible results.

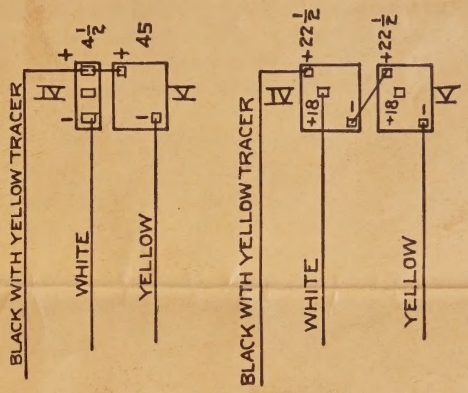

Fig. 9

With the Bosch Nobattry, Edition 5, or with Bosch Nobattrys using type "BH" rectifier tubes, it is necessary to use —45 volts "C." Connections are as shown in figure 9, using a 4½-volt battery for battery IV, and a 45-volt battery for battery V, or using two 22½-volt batteries.

Tube Recommendations

For satisfactory operation of the "Little Six" Receiver only RCA or Cunningham tubes of the 5-volt filament type should be used.

For the *1st, 2nd and 3rd Radio frequency* stages, the Type 201A should be used.

For the *detector* stage use a Type 201A.

For the *1st audio* frequency stage, a type 201A should be used. "HI-MU" or Type 240 tubes will not be satisfactory.

For the *2nd audio* frequency stage, either a Type 112 or Type 171 should be used. The latter tube will not give greater volume, but will give distortionless reproduction at maximum volume. (See "C" battery recommendations).

Installation

Location: The location of the receiver is relatively unimportant. It should not, however, be placed in the close proximity of electrical equipment or near walls carrying electrical power to motors.

Outside Antenna: A single wire antenna of from 80 to 120 feet in length is recommended. The wire should be size No. 14 bare or enameled copper wire, either solid or stranded. It should be swung clear of large trees, metal roofs, and the metal framing of buildings. *Do not run the antenna over or under any type of line carrying electric power.* The antenna should be fastened to an insulator at each end, the insulator in turn secured to the pole or other support of the antenna.

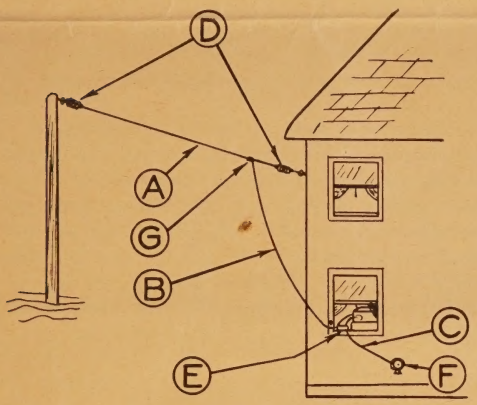

Fig. 10—Typical Antenna Installation

Reference to the typical antenna installation (Fig. 10) will show the antenna (A) supported by the two insulators (D). The "lead-in" (B) must be soldered to the antenna at point (G) unless it is a continuation of the antenna wire itself. The "lead-in" should be attached to an approved lightning arrester (E) and then brought in to the receiver.

Run the antenna to any available support, but endeavor to so locate it that the "lead-in" will be as short as possible. Interference from neighboring power and trolley lines will be minimized by locating the antenna at right angles to them. The direction of the antenna does not have an appreciable effect on reception.

Connect the "lead-in" to the antenna post of the "46" which gives the best results. In general, connection to the "long" terminal increases selectivity, and connection to the "short" terminal improves volume. Volume and sensitivity are dependent also on the length of the antenna. A long antenna improves sensitivity at the expense of selectivity.

In locations, therefore, which are subject to interference from several local broadcasting stations, a short antenna will give the better results. Where interference is at a minimum, use a long antenna to obtain good reception from distant stations.

Note: Do not run the "lead-in" to the receiver near the battery cable or speaker cord. Keep it away from all parts of the set.

Ground: A lightning arrester must be connected between antenna and ground. Run a No. 14 insulated wire (C) from the "ground" terminal of the arrester to an approved ground connection. Such a ground consists of water pipes located inside or outside of a building, steel frames of buildings, and artificial grounds, such as pipes, plates, etc., buried in moist earth. *Do not connect to a gas pipe.*

Connect the receiver to "ground" by running a piece of insulated wire (flexible lamp cord) from the "ground" post of the set either to the "ground" term-

Tube Characteristics

Type	*Use*	*"A" Supply*	*Filament Voltage*	*Filament Current*	*Plate Voltage*	*Plate Current*	*"C" Voltage*	*Socket Location*
201-A	Detector	6 volts	5 volts	.25 amp.	45	2 M.A.	.....	11
	R.F. Amp.	6 "	5 "	.25 "	90	5-7 M.A.	.....	8, 9, 10
	A.F. Amp.	6 "	5 "	.25 "	90	2 M.A.	—4½	12
200-A	Detector	6 "	5 "	.25 "	45	2 M.A.	.....	11
112	A.F. Amp.	6 "	5 "	.50 "	135	6 M.A.	—9	13
171	A.F. Amp.	6 "	5 "	.50 "	135-180	16-20 M.A.	—27 to —40	13

Tubes should occasionally be tested to determine their condition. A tube will sometimes light, but be otherwise inoperative.

The filament voltage of the "46" is automatically adjusted to 5 volts, eliminating all rheostats and filament controls.

inal of the lightning arrester, or to a nearby ground connection, such as a water pipe or steam radiator. Make the connection by means of an approved ground clamp, making sure that the pipe is scraped clean of rust, paint, or scale to insure good electrical contact.

Inside Antenna: In some locations, it is impossible to erect an outside antenna, and in this case, the receiver may be operated from a wire within the house. An attic makes an ideal location for such an antenna. Make the wire as long as the space permits, running a connection from one end down to the receiver. No lightning arrester is necessary, but the receiver must be grounded to a suitable water pipe or other ground.

Reproducer: (Speaker). Reproducer connections are made by simply connecting the reproducer cord tips to the two terminals provided on the socket strip of the receiver. Insert the cord with the colored tracer into the post marked "+". Polarity is unimportant with Bosch reproducers, but with some types of speakers it is essential that the polarity be correct. When the receiver is in operation, the connections may be reversed to determine which connection gives the best results. It is not advisable to place the reproducer on the cabinet.

If the reproducer is to be located at some distance from the receiver, use a Bosch special 20-foot extension cord.

Power: The "A," "B" and "C" supply must be chosen and connected in accordance with instructions under the heading "Power Supply." See figures 3 to 9. In installation of the Model 46 Receiver the power units or batteries may be placed in any convenient location near the receiver within reach of the power supply cable. It is often possible to conceal them in a closet or place them on a shelf immediately below the set, or in the cellar, by running the power cable through the floor. Arrange the various units most conveniently.

Automatic Relay: There are several automatic switches on the market which entirely do away with the turning on and off of chargers and eliminators. Such a relay is particularly desirable with the Model 46 when it should be necessary to place the power supply in an inaccessible location. In this way the entire power supply is automatically controlled by turning the receiver "on" or "off" thru the regular volume control switch. Correct connections to a typical relay are given in Fig. 11.

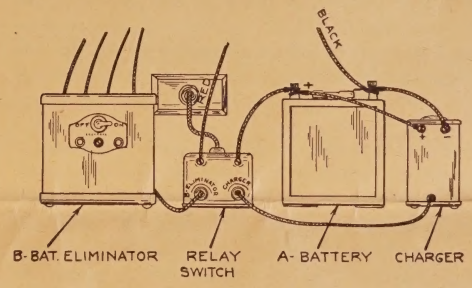

Fig. 11—Automatic Relay Switch

Installing the Tubes: After the power supply connections have been made as outlined in the preceding paragraph, the tubes may be inserted in their sockets. It is best to insert one tube only at first, turning the receiver "on" to check the correctness of connections. If the tube does not light, carefully go over the "A" supply. If the tube should flash and burn out, it is an indication that connections were incorrectly made.

The tubes should be inserted in their respective sockets with the small pin located on the side of the tube base pointing in the same direction as the small arrow molded into the socket. To insert, push straight down on the tube. It is withdrawn by a straight upward pull. When changing tubes, the receiver should be switched "off."

Tube Location—Fig. 2

1st Radio Frequency.....Socket 8...Type 201-A
2nd Radio Frequency.....Socket 9...Type 201-A
3rd Radio Frequency.....Socket 10...Type 201-A
Detector .....Socket 11...Type 201-A or 200-A
1st Audio Frequency.....Socket 12...Type 201-A
2nd Audio Frequency.....Socket 13...Type 112 or 171

Preliminary Operation

For your first experience with the "Little Six" Receiver select a nearby station for reception.

Turn the Volume Control (3 Fig. 1) fully to the right. A distinct "hissing" or "frying" sound will be heard in the speaker.

Turn the "Clarifier" (2 Fig. 1) to the point where the "hissing" is loudest.

Turn the "Station Selector Drum" (1 Fig. 1) slowly until a station is heard. Leave the Selector Drum set at the point of greatest volume.

The volume may now be adjusted by simply turning the "Volume Control" in the required direction. Never adjust the volume by "de-tuning" (with the Station Selector) as the tone quality will suffer.

After the "Clarifier" has been set as described above, you can "cruise the air" by simply turning the "Station Selector." Keep the "Volume Control" turned well to the right to obtain distant stations. Slight readjustment of the "Clarifier" will increase the volume of weak signals and cut out interfering stations.

Note: If no point is found on the "Clarifier" where volume is maximum, try connecting the antenna to the other antenna terminal.

Advanced Operation

When you are familiar with the operation and control of your receiver on local and semi-distant reception, there are certain minor adjustments, which, when once made, will permanently improve the operation of your "Little Six." Tune the receiver to a station whose reception comes in with fairly good volume—preferably not a local.

Tubes: Reduce the volume to a low level, thus making slight changes more noticeable to the ear. Try changing the location of your tubes (except the 2nd audio frequency) always endeavoring to pick out one which will act best as a detector. When the most sensitive detector is found, try picking from the remaining tubes the best combination as radio frequency amplifiers. The tube which gives the poorest operation may be used in the first audio frequency socket.

Eliminator: If your "B" eliminator is provided with variable voltage controls or taps, as in the Bosch Nobattry, try the effect of varying these controls while the receiver is in operation. Leave them in the position giving the best reception.

"C" Battery: Variation in the "C" battery voltages will affect the tone of the receiver. As these voltages are decreased the tone becomes deeper until distortion takes place. Increase in "C" voltage reduces the current drawn and adds to the life of "B" batteries or eliminator. With your receiver operating, try various connections of both the *white* and *yellow* leads of the cable on the "C" battery. It is especially important that the correct voltage be applied to the *yellow* wire when a 171 power tube is used. Use the combination giving the most pleasing tone.

Speaker: Some reproducers, such as the Bosch Ambotone, are provided with external adjustments. Find the position which gives the most satisfactory operation. Reversal of the reproducer cord tips in the terminal posts may also affect the tone and volume of the speaker. The position of the reproducer in the room may also be experimented with to advantage.

The making of adjustments as outlined above will insure the operation of your receiver at its highest efficiency. Reception of very distant stations may now be attempted, knowing that you are limited only by external conditions.

Maintenance

A radio installation, like any other thing, requires a certain amount of attention. It will be noticed, however, that the receiver itself necessitates only a minimum amount of care. Poor reception or other trouble is usually thoughtlessly blamed on the receiver, although slight attention to the upkeep of the accessories would have obviated it. The following hints will prove of value in keeping your "46" operating at its best.

Storage Battery: Your battery must be filled with distilled water often enough to keep the water level above the plates. Different types of batteries vary in the length of time they will operate with refilling. The amount of "charge" in your battery is measured by the hydrometer, an inexpensive device easily obtainable at radio and automotive supply stores. As shown in figure 13, it consists of a glass syringe containing a small glass float. The float is graduated in divisions from 1300 to 1100, and is often provided with three colored bands, indicating the approximate condition of the battery, namely "Full Charge," "Half Charge" or "Dead."

When the reading is from 1250 to 1300 the battery is fully charged and the trickle charger is operating satisfactorily. If the reading is below 1250, increase

the charging rate. Check your battery at least every month.

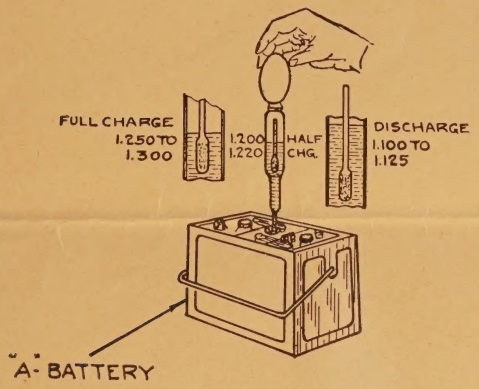

Fig. 13—Use of Hydrometer for Battery Testing

Trickle Charger: Some types of chargers require the addition of water at stated intervals. Use only distilled water, and refill as indicated on the charger.

Eliminator: Some types require the addition of water or electrolyte. Care for this unit according to the manufacturers' instruction. The Bosch Nobattry requires no attention.

"C" Batteries: These require renewing only when their maximum "shelf life" is reached, that is, deterioration is due only to age, no current being drawn from them. Their voltage should be tested at least every few months and if an appreciable decrease is found they should be renewed. Poor "C" batteries will ruin the tone qualities of any receiver.

Tubes: It is advisable to purchase a spare tube of the Type 201A to use as a standard of comparison. When in doubt as to the condition of any tube, compare its operation with that of the standard in the same socket. Tubes will often light but be otherwise inoperative. Use your poorest tube in the 1st audio frequency socket of the set. Tubes must be handled carefully, and must never be removed or inserted with the switch "on."

Reproducer: Occasionally check the adjustment to keep this unit at its best performance.

Antenna and Ground: Look over this system several times a year for loose, corroded or broken connections. Ground clamps and connections from the "lead-in" to the antenna are especially important.

Receiver: The "Little Six" will operate continuously without attention of any kind. Replacement of the dial light is easily made if this should become accidentally burned out.

Important: When replacing the lamp be sure your set is "off." If "B" batteries are used they should be disconnected.

The light is replaced as follows:

1. Turn dial to "100" position.
2. Reach in from the rear of the receiver.
3. Unscrew lamp from the socket and replace with a new lamp.

Microphonic Howl: Reaction between the reproducer and the detector tube of the receiver may, in some cases, cause a "microphonic howl." This is a hum which gradually increases in volume until the volume is sufficient to drown out the signals.

It may be remedied by finding a tube for the detector socket which is less sensitive to vibration, or by changing the position of the reproducer in respect to the set.

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